What is claimed is:

1. Compounds having the structure of (I), as well as pharmaceutically acceptable salts, prodrugs and solvates thereof:

$$\begin{array}{c|c}
R^3 & R^2 \\
R^3 & X^2 \\
R^4 & X^2 \\
Y^2 & Y^2 \\
R^5
\end{array}$$

wherein,

5

R¹ and R² are independently amino, protected amino or modified amino,

(I)

 X^1 and X^2 are independently O, S or NH,

Y¹ or Y² is a bond or a divalent linking group,

10 R³ is selected from the group consisting of the formula (II) or (III):

$$R^8$$
 R^9
 R^7
 R^6

$$\begin{array}{c|c}
(II) \\
R^9 \\
0 \\
R^7 \\
R^6
\end{array}$$

(III)

R⁶, R⁷, R⁸ and R⁹ can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁶, R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (II-1) and (III-1).

one of R^4 and R^5 is hydrogen, hydroxyl protecting or modified hydroxyl group when one of Y^1 or Y^2 is a bond and the other is selected from a group consisting of formula (II), (III), (IV), (V), (VI) or (VII):

10

5

$$\begin{array}{c}
(IV) \\
R^{8} \\
 R^{7} \\
 Z \\
 R^{10}
\end{array}$$

(V)

Z can be O, S or NH,

R⁷, R⁸ and R⁹ can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁷, R⁸ and R⁹ can be independently another monoe- or disaccharide (II), including disaccharides (IV-1) and (V-1)

R¹⁰ can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group, and R¹¹ can be a hydrogen, halogen or alkyl group.

2. A method for synthesizing compounds having the structure of (I), as well as pharmaceutically acceptable salts, prodrugs and solvates thereof:

$$\begin{array}{c|c}
R^3 & R^2 \\
R^4 & X^1 & X^2 \\
R^4 & X^2 & Y^2 \\
R^5 & R^5
\end{array}$$

(I)

wherein,

5

R¹ and R² are independently amino, protected amino or modified amino,

 X^1 and X^2 are independently O, S or NH,

Y¹ or Y² is a bond or a divalent linking group,

R³ is selected from the group consisting of the formula (II) or (III):

(II)

(III)

10 R⁶, R⁷, R⁸ and R⁹ can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl,

keto or a halogen or R⁶, R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (II-1) and (III-1).

one of R⁴ and R⁵ is hydrogen, hydroxyl protecting or modified hydroxyl group when one of Y¹ or Y² is a bond and the other is selected from a group consisting of formula (II), (III), (IV), (V), (VI) or(VII):

$$\begin{array}{c}
(IV) \\
R^8 \\
R^7 \\
Z \\
R^{10}
\end{array}$$

$$\begin{array}{c}
(V) \\
R^{2} \\
R^{3} \\
X^{1} \\
X^{2} \\
H
\end{array}$$

$$(VI)$$

$$R^3$$
 R^2
 R^3
 R^1
 R^1
 R^1
 R^1
 R^1

Z can be O, S or NH,

R⁷, R⁸ and R⁹ can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino,

hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (IV-1) and (V-1)

R¹⁰ can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group, and R¹¹ can be a hydrogen, halogen or alkyl group.

3. Compounds having the structure of (la), (lb), (lc), (ld), (lla), (lla), (lVa) or (Va):

(IIa)

(IIIa)

(IVa)

(Va)

wherein, L is a leaving group,

5 A is a carbohydrate-activating group,

R¹ and R² are independently amino, protected amino or modified amino, R³ is selected from the group consisting of the formula (II) or (III),

R⁶, R⁷, R⁸ and R⁹ can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino,

hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen.

R⁶, R⁷, R⁸ and R⁹ can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁶, R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (IIa-1) and (IIIa-1).

$$R^{8}$$
 R^{9}
 R^{7}
 R^{6}
 R^{9}
 R^{7}
 R^{6}
 R^{9}
 R^{7}
 R^{6}
 R^{7}
 R^{7

R⁷, R⁸ and R⁹ can also be independently another mono- or disaccharide (II), including disaccharides (IVa-1) and (Va-1)

One of X¹ or X² is O, the other can be a protected hydroxyl or modified hydroxyl,

Z can be O, S or NH,

R¹⁰ can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group, and

R¹¹ can be a hydrogen, halogen or alkyl group.

4. A method for synthesizing compounds having the structure of (Ia), (Ib), (Ic), (Id), (IIa), (IVa) or (Va):

(IIa)

(IIIa)

(IVa)

(Va)

wherein, L is a leaving group,

5

15

A is a carbohydrate-activating group,

R¹ and R² are independently amino, protected amino or modified amino, R³ is selected from the group consisting of the formula (II) or (III),

R⁶, R⁷, R⁸ and R⁹ can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino,

hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen,

R⁶, R⁷, R⁸ and R⁹ can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁶, R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (IIa-1) and (IIIa-1).

R⁷, R⁸ and R⁹ can also be independently another mono- or disaccharide (II), including disaccharides (IVa-1) and (Va-1)

One of X¹ or X² is O, the other can be a protected hydroxyl or modified hydroxyl,

Z can be O, S or NH,

R¹⁰ can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group, and

R¹¹ can be a hydrogen, halogen or alkyl group.

5. A pharmaceutical composition for the prophylaxis, amelioration or treatment of a bacterial infection, viral infection, a cancer, or a genetic disorder in mammals avian, fish and reptile species as well as in cell culture, which comprises a therapeutically effective amount of a compound of formula I or a pharmaceutically acceptable salt, prodrug or solvate thereof,

10

(I)

wherein,

5

R¹ and R² are independently amino, protected amino or modified amino,

X¹ and X² are independently O, S or NH,

Y¹ or Y² is a bond or a divalent linking group,

R³ is selected from the group consisting of the formula (II) or (III):

(II)
$$R^{8} \longrightarrow 0$$

$$R^{7} \longrightarrow R^{6}$$

(III)

R⁶, R⁷, R⁸ and R⁹ can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁶, R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (II-1) and (III-1).

one of R^4 and R^5 is hydrogen, hydroxyl protecting or modified hydroxyl group when one of Y^1 or Y^2 is a bond and the other is selected from a group consisting of formula (II), (III), (IV), (V) or (VI):

$$(IV)$$

$$R^{8} \xrightarrow{R^{11}} O$$

$$Z$$

$$Z$$

$$R^{10}$$

$$(V)$$

$$R^{2}$$

$$X^{1}$$

$$X^{2}$$

$$H$$

$$(VI)$$

$$R^3$$
 R^2
 R^3
 R^2
 R^3
 R^2
 R^3
 R^2
 R^3

Z can be O, S or NH,

R⁷, R⁸ and R⁹ can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino,

hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (IV-1) and (V-1)

R¹⁰ can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group,

R¹¹ can be a hydrogen, halogen or alkyl group, and a pharmaceutically acceptable carrier.

6. A method for treating, preventing, or ameliorating a bacterial infection, a viral infection, a cancer, or a genetic disorder in mammals avian, fish and reptile species as well as in cell culture, which comprises administering a therapeutically effective amount of a compound of formula I or a pharmaceutically acceptable salt, prodrug or solvate thereof,

(I)

wherein,

5

R¹ and R² are independently amino, protected amino or modified amino,

X¹ and X² are independently O, S or NH,

Y¹ or Y² is a bond or a divalent linking group,

R³ is selected from the group consisting of the formula (II) or (III):

$$\begin{array}{c|c}
(II) \\
R^9 \\
0 \\
R^7
\end{array}$$

(III)

R⁶, R⁷, R⁸ and R⁹ can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁶, R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (II-1) and (III-1).

one of R^4 and R^5 is hydrogen, hydroxyl protecting or modified hydroxyl group when one of Y^1 or Y^2 is a bond and the other is selected from a group consisting of formula (II), (III), (IV), (V) or (VI):

$$\begin{array}{c}
(IV) \\
R^8 \\
R^7 \\
Z \\
R^{10}
\end{array}$$

$$(V)$$

$$R^{3}$$

$$X^{1}$$

$$X^{2}$$

$$H$$

$$(VI)$$

$$R^3$$
 R^2
 R^3
 R^2
 R^3
 R^2
 R^3

Z can be O, S or NH,

R⁷, R⁸ and R⁹ can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino,

hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (IV-1) and (V-1)

R¹⁰ can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group,

R¹¹ can be a hydrogen, halogen or alkyl group, and a pharmaceutically acceptable carrier.

7. An antibacterial, antiviral or antifungal agent comprising a compound of formula I,

-10

$$\begin{array}{c|c}
R^3 & R^2 \\
R^4 & X^1 & X^2 \\
R^4 & X^2 & X^2 \\
X^2 & X^5 & R^5
\end{array}$$

(I)

wherein,

5

R¹ and R² are independently amino, protected amino or modified amino,

X¹ and X² are independently O, S or NH,

Y¹ or Y² is a bond or a divalent linking group,

R³ is selected from the group consisting of the formula (II) or (III):

$$\begin{array}{c|c}
(II) \\
R^9 \\
0 \\
R^7 \\
R^6
\end{array}$$

(III)

R⁶, R⁷, R⁸ and R⁹ can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁶, R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (II-1) and (III-1).

one of R^4 and R^5 is hydrogen, hydroxyl protecting or modified hydroxyl group when one of Y^1 or Y^2 is a bond and the other is selected from a group consisting of formula (II), (III), (IV), (V) or (VI):

(IV)

$$(V)$$

$$R^{2}$$

$$X^{1}$$

$$X^{2}$$

$$H$$

$$(VI)$$

$$R^3$$
 R^2
 R^1
 X^1
 X^2
 X^2
 X^2
 X^2
 X^2

Z can be O, S or NH,

R⁷, R⁸ and R⁹ can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (IV-1) and (V-1)

R¹⁰ can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group,

R¹¹ can be a hydrogen, halogen or alkyl group, and an acceptable carrier.

8. A method for preventing, inhibiting, or stopping the growth of bacteria on a surface or within the material of the surface or within the material of the surface, comprising applying to a surface or within the material of the surface an effective amount of an antibacterial agent comprising a compound of formula I, and an acceptable carrier.

10

$$\begin{array}{c|c}
R^3 & R^2 \\
R^3 & X^2 \\
R^4 & X^2 \\
X^2 & Y^2 \\
R^5
\end{array}$$

(I)

wherein,

5

R¹ and R² are independently amino, protected amino or modified amino,

X¹ and X² are independently O, S or NH,

Y¹ or Y² is a bond or a divalent linking group,

R³ is selected from the group consisting of the formula (II) or (III):

$$\begin{array}{c|c}
(II) \\
R^9 \\
R^7 \\
R^6
\end{array}$$

(III)

R⁶, R⁷, R⁸ and R⁹ can be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino, hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁶, R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (II-1) and (III-1).

one of R^4 and R^5 is hydrogen, hydroxyl protecting or modified hydroxyl group when one of Y^1 or Y^2 is a bond and the other is selected from a group consisting of formula (II), (III), (IV), (V) or (VI):

$$R^8$$
 R^9
 R^7
 Z
 R^{10}
 R^{10}

$$(V)$$

$$R^{3}$$

$$X^{1}$$

$$X^{2}$$

$$H$$

$$(VI)$$

$$R^3$$
 R^2
 R^3
 R^2
 R^1
(VII)

Z can be O, S or NH,

R⁷, R⁸ and R⁹ can also be independently a hydrogen, hydroxyl, protected hydroxyl, modified hydroxyl, amino, protected amino, modified amino,

5 hydroxymethyl, protected hydroxymethyl, aminomethyl, protected aminomethyl, keto or a halogen or R⁷, R⁸ and R⁹ can be independently another mono- or disaccharide (II), including disaccharides (IV-1) and (V-1)

R¹⁰ can be hydrogen, an alkyl group, an amine protecting group, modified amino, hydroxyl protecting or modified hydroxyl group, and R¹¹ can be a hydrogen, halogen or alkyl group.